MATERIAL AND METHODS
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The present study has been conducted at M.L.B. Medical College Hospital, Jhansi from May 1981 to April 1982 to compare the effects of amniotic membrane and collagen sheet application over superficial thermal burns as bio-dressings.

Collection of Amniotic Membrane

The amniotic membranes were collected from the labour rooms and obstetric operation theatres of M.L.B. Medical College Hospital and District Hospital Jhansi at the time of labour or caesarian section. The mothers having intact membranes and without any history suggestive of genital tract infections, were selected for collection of amniotic membrane. Parity and blood group of mother were not considered. The placenta with intact membrane was taken directly in a clean tray and was washed thoroughly in running tap water to remove blood and mucoid material.

Separation of Amniotic Membrane from the Placenta

The thoroughly washed placenta was transferred to another clean tray filled with water. The amniotic membrane was separated from chorion and placenta, gently starting from the periphery up to the base of the umbilical cord. The separated amniotic membrane was cut at the base of umbilical cord and spread over flat
surface in a sterile container filled with sterile normal saline. The remaining clots were removed gently from its surface with the help of sterilized gauze pieces. It was further cleaned with sterile normal saline. The amniotic membrane thus obtained was thin, transparent, elastic and shining with whitish hue.

**Preservation of amniotic membrane**

Amniotic membranes were preserved in the sterile infusion bottles of normal saline treated with 10 lac units of Benzyl penicillin and 1 gram of streptomycin sulphate. These bottles were kept in refrigerator at 4°C till the time of application. The preserved membrane was continuously watched for bad odour and change in colour from white to yellow or brown.

**Collagen sheet**

The collagen sheets were supplied by Central Leather Research Institute Adyar, Madras in glass ampoules with a preserving fluid containing ethylene oxide.

**Selection of cases**

All the cases with superficial burns of less than 50% of body surface who came to the emergency or out patient department of this hospital with in 72 hours of the thermal injury were included in this study irrespective of their age, sex, socioeconomic status, contamination of wound and mode of injury.
Method of study

History and physical examination

The selected cases were subjected to detailed history and physical examination which were recorded on following lines -

History

Introduction - Name, Age, Sex, Occupation, Rural/Urban, Address, Date of admission, Date of discharge and Time of healing.

Regarding the burn accident
- Date and time of burn (duration of burn).
- Place of accident and nature of work at the time of accident.
- Cause of burn.
- Prior treatment (if any).
- Symptoms.

Physical examination

General Examination - The case was examined for general condition, pulse, blood pressure, temperature, respiration and hydration.

Local Examination -
(A) Percentage of burn - It was calculated by "Wallace's rule of Nine" in the adult and by "Lund and Browder Chart" in children.
(B) Depth of burn - Superficial/Deep.
Estimation of depth of burn

The hypodermic needle was used to test the pain sensation. The area with increased sensibility was considered to be superficial or partial thickness burn. The area with markedly reduced or absent pain sensibility was considered to be deep or full thickness burn. This was also confirmed by pulling out a hair from burn surface. In the 3rd degree or deep burn, hair pulls out easily and painlessly. The later test is of value in borderline cases of second degree burn. In addition, help of the following criteria was also sought.

<table>
<thead>
<tr>
<th>Classification of depth</th>
<th>Appearance of burn area</th>
<th>Pain sensation</th>
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</thead>
<tbody>
<tr>
<td>1st degree</td>
<td>Erythematosus</td>
<td>Painful and hyperesthetic.</td>
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<tr>
<td>IIInd degree (A)</td>
<td>Blister with reddened base and moisture</td>
<td>Painful and hyperesthetic.</td>
</tr>
<tr>
<td>IIInd degree (B)</td>
<td>Blister with blanched base and moisture</td>
<td>Painful, hyperesthetic or anaesthetic at places.</td>
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<tr>
<td>IIIrd degree</td>
<td>Leathery pale or pearly white or charred dry</td>
<td>Painless and anaesthetic.</td>
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</tbody>
</table>

The I and II(A) were included as superficial and II(B) and III were considered as deep burn.

(C) Contamination of wound

Apparently clean: No contamination of foreign body, clean intact blisters.
Mild Contamination: Slight contamination, ruptured blisters, open wounds.

Gross contamination: Heavy contamination with dirty cloth, foreign body, dust, and/or non medical substances i.e. cowdung, mud etc.

(D) Area involved - Diagrammatic representation in anterior posterior and lateral views (shown in attached proforma) was done.

Resuscitation and general treatment

The resuscitation was done and treatment was started on conventional lines (i.e. I/V infusions, blood and plasma transfusion, analgesic, antibiotics and tetanus prophylaxis).

Local management of wound

On the basis of local management of wound patients were divided into following groups:

Group A - Amniotic membrane was applied over full burn area.

Group B - Collagen sheet was applied over full burn area.

Group C - Amniotic membrane was applied over a part of burn area ($C_1$) and remaining area was treated by open gauze piece application with Betadine or Silver Sulphadiazine ($C_2$).

Group D - Collagen sheets were applied over a part of burn area ($D_1$) and remaining area was treated...
by open gauze piece application with Betadine or Silver Sulfadiazine ($D_2$).

Group E - Amniotic membrane was applied over one part of burn area and collagen sheet on other part.

**Preparation of burn surface**

Swab from burn surface was taken for culture and sensitivity test. The patient was given necessary sedation. A gentle but thorough debridement of wound was done by removing necrosed skin and blisters. The area was again tested for degree of burn. Then the wound was cleaned with 0.5% savlon solution twice followed by sterile normal saline thoroughly. The spirit was applied over the adjacent skin around the margin of wound area. Now the wound area was dressed locally according to the proposed group.

**Application of amniotic membrane:**

Fresh or preserved amniotic membrane was taken out from the bottle with the help of forceps. The membrane with bad odour and colour changes were discarded. It was stretched open and then applied over burn area about one inch beyond the margins. The temperature of membrane was not considered. The air bubbles between membrane and wound area were removed. The patients were instructed not to move the part until the membrane became adhered and relatively dry. It was left as such without any dressing except in children and uncooperative
patients where the dressing was applied to retain the membrane.

Application of collagen sheets

The collagen sheet was taken out from glass ampoules by cutting it at the marker in the middle of it. It was washed in sterile normal saline (obtained from sealed bottle) to remove its preservative ethylene oxide which is very much irritant to raw burn area. The sheet was spread over and made to dry for half a minute. Then it was applied over burn area covering at least 1-2 cm of adjoining normal skin around burn margins. The air bubbles were removed. Dressing were applied in all the cases to retain it in place and removed after 12 hours. If the sheet adhered firmly after 12 hours no further dressings were applied. If not then dressings were applied again for further 12 hours.

Application of antibiotic gauze pieces

The gauze pieces soaked in antibacterial agents were applied over raw surface to cover it fully. Betadine, Silversulfadizine solution and cream, Soframycin and Gentacycin cream were used as local antimicrobial agents. These dressings were changed regularly as indicated by soakage and discharge.

Assessment of the case

The assessment of the results was done
by interview with patient, examination at regular visits and investigations.

**Interview** - The patient was asked about:
1. Pain and discomfort (Mild, Moderate or Severe)
2. Fever
3. Any evidence of allergy as itching, rashes, nausea and vomiting.

**Physical examination**

**General examination** - The case was examined for general condition, hydration, pulse, blood pressure and signs of toxaemia.

**Local examination** - Observation for the following was done -
1. Presence of discharge and/or soakage.
2. Appearance of amniotic membrane and/or collagen sheet as regard to surface, margin, thickness, lusture, colour, dryness and adherence.
3. Appearance of burn area covered with antibiotic gauze pieces.
4. Collection of pus under dressing - If the pus was localized in small area underneath amniotic and/or collagen sheet, a slit was given in it. A pus swab was taken for culture and sensitivity test. If the pus is underneath whole of membrane and/or collagen sheet...
localized at many places, then the biological dressing was removed and burn surface was treated with anti-biotic gauze pieces.

(5). Result of healing.

Investigations


Urine-gross and microscopic examination.

2. Culture and sensitivity test for pus if present:

This was cultured on blood agar and chocolate agar media, which were kept in refrigerator at 0-4°C temperature for 24 hours. Antibiotic sensitivity was done in the cases, where growth of pathogenic bacteria was revealed.
PROFORMA

Name
Occupation
Address
Group

Age/Sex
Rural/Urban
Date and time of admission.
Date and time of discharge.
Total time of healing

HISTORY

(i) Date and time of burn
(ii) Place of work and nature of work at the time of burn
(iii) Cause of burn
(iv) Prior treatment (if any)

SYMPTOMS

(i) Pain
(ii) Burning
(iii) Blister
(iv) Fever
(v) Oliguria
(vi) Discharge from wound surface
(vii) Difficulty in swallowing or in inspiration
(viii) Any other

PHYSICAL EXAMINATION

(a) General examination at time of admission
   -G.C.
   -Pulse
   -R.P.
   -Temperature
   -Hydration
(b) Local examination

- Percentage of burn
- Depth of burn/Degree of burn
- Contamination
- Appearance of raw area
- Area involved (Diagramatic)

![Body Diagrams](ant, pos, lat)

**Progressive report -**

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**Collection sheet**